Check List 8(5): 889–893, 2012
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ISSN 1809-127X (available at *www.checklist.org.br*)

Check List
Journal of species lists and distribution

NOTES ON GEOGRAPHIC DISTRIBUTION

Pleurostict scarabs (Coleoptera: Scarabaeidae): New distributional records in Arunachal Pradesh, north-east India

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ABSTRACT: Based on the specimens present in Zoological Survey of India, (Jabalpur), the paper presents new distributional record of 12 species of Pleurostict Scarabaeidae, comprising eight species of Rutelinae, two species of Cetoniinae, one species each of Melolonthinae and Dynastinae from Arunachal Pradesh (India).

Scarab beetles under family Scarabaeidae, comprise a speciose group and are a conspicuous component of the beetle fauna of the World and adults of these beetles are noticeable due to their relatively large size, bright colors, often elaborate ornamentation and interesting life histories. The Scarabaeoidea is one of the largest superfamilies in the order Coleoptera and includes approximately 31,000 species worldwide of which the family Scarabaeidae is composed of about 91% of all the scarabaeoids and includes about 27,800 species worldwide (Jameson and Ratcliffe 2001). Excluding fossil taxa, currently the family is divided in to 16 subfamilies, 82 tribes and 94 sub tribes (Smith 2006). On the basis of the position of the posterior spiracles, the family is generally divided into two major groups, Laparosticti (dung beetles) and Pleurosticti (chafers) (Sawada 1991). The latter group (Pleurosticti) is strictly phytophagous with various feeding habits, including some species that do not feed at all in the adult stage while the former one include coprophagous beetles feeding mostly on dung, carrion and vegetable matters.

Chronologically the scarab beetle diversity in the north-eastern states of India had been carried out by various researchers namely Arrow (1910, 1917, 1931); Biswas and Chatterjee (1985); Chatterjee and Biswas (2000a, b); Chatterjee (2004); Sewak (2006); Ahrens and Fabrizi (2009); Singh *et al.* (2010) and Li *et al.* (2010). Recently the fauna of the Laparostict scarabs of Arunachal Pradesh has been compiled and constitute 73 species belonging to 14 genera under subfamily Scarabaeinae of family Scarabaeidae (Sewak 2006) while the Pleurostict scarab fauna is completely lacking despite few scattered publications. Singh *et al.* (2010) presented a list of 70 species of beetles (Coleoptera) of Kane Wildlife Sanctuary from Arunachal Pradesh and included 12 species of the family Scarabaeidae. Recently Li *et al.* (2010) revised the *Melolontha guttigera* group and presented interactive keys and described male genitalia as well as the checklist of the East and South-East Asian *Melolontha*. Records on the diversity and distribution of the scarab beetles of the subfamilies *viz.* Melolonthinae, Rutelinae, Dyanstinae and Cetoniinae from Arunachal Pradesh are completely lacking.

Specimens examined for the present study constitute the unidentified collections of the Pleurostict scarabs, collected from Itanagar (Arunachal Pradesh) (Figure 1). Arunachal Pradesh is situated between 26°28' and 29°30' N Latitudes and 97°30' and 97°30' E Longitudes covering an area of 83743 km^2. Bio-geographically it is situated in the Eastern Himalayan province, the richest bio-geographical province of the Himalayan zone. The entire territory forms a complex hill system with varying elevations ranging from 50m in the foot-hills and gradually ascending to about 7000m, traversed throughout by a number of rivers and rivulets. Rainfall varies from 1000mm in higher reaches to 5750mm in the foot-hill areas, spread over 8-9 months excepting the drier days in winter. The vegetation can be classified as tropical forests, sub tropical forests, pine forests, temperate forests and alpine forests.

Pinned specimens were identified with the help of available keys and faunal works mainly of Arrow (1910; 1917) and Li *et al.* (2010). The details of specimens examined, registration number of collected specimens, distribution in India as well as outside India along with the main diagnostic characters of each species are given. All the species are listed with their valid names, authority and the year of description. Species are listed systematically by tribe and within genera the species are listed alphabetically. The classification adopted in the article is that of Smith (2006). Voucher specimens were deposited in National Zoological Collections of Central Zone Regional Centre, Zoological Survey of India, Jabalpur, Madhya Pradesh, Ministry of Environment and Forests, India.

Altogether twelve species of the Pleurostict scarabs belonging to seven genera, five tribes and five sub tribes under four subfamilies of family Scarabaeidae were

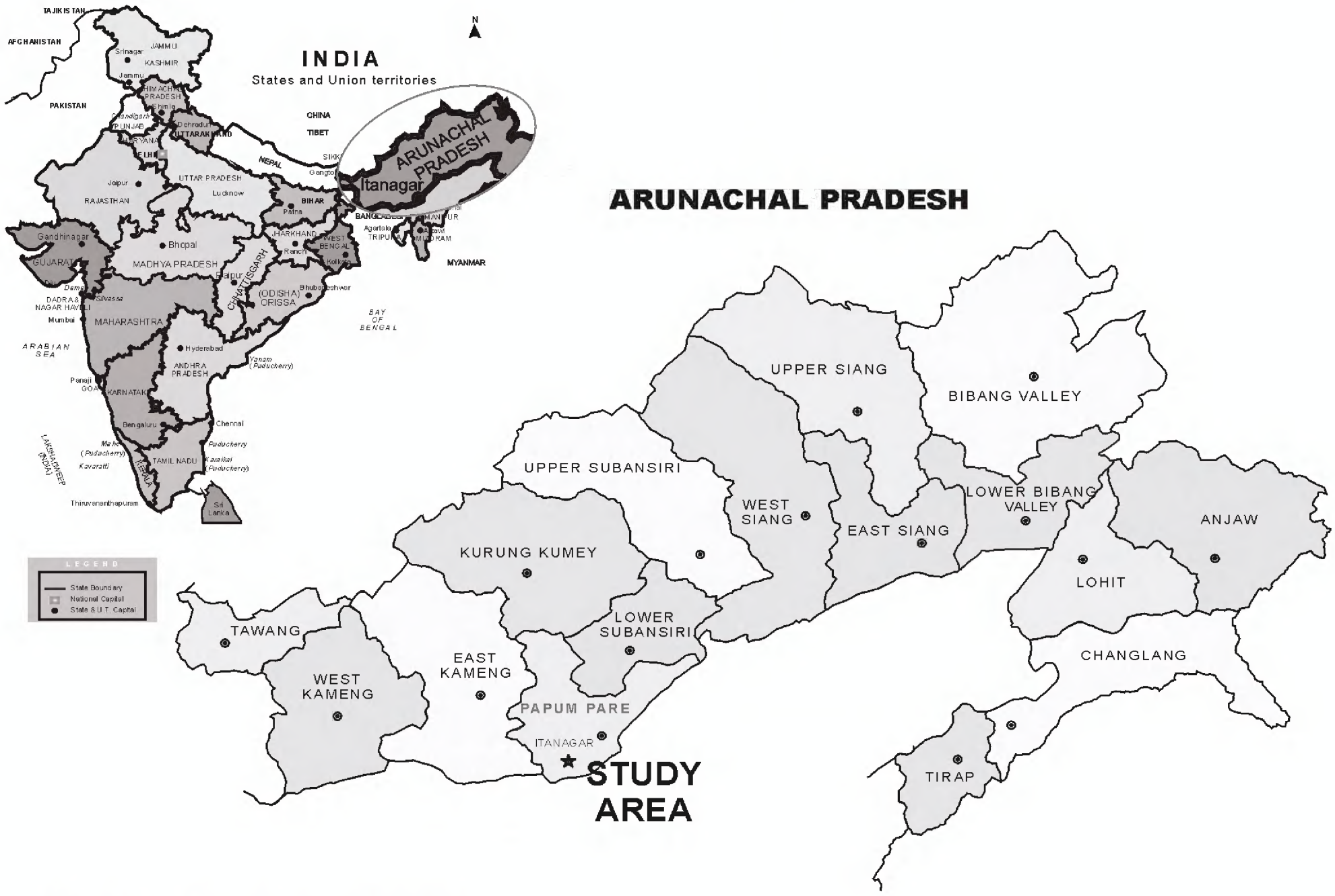

Figure 1. Study Area: Itanagar (Arunachal Pradesh).

studied. Except *Anomala dimidiata* (Hope, 1831), rest of the eleven species are reported as new to the scarab beetle fauna of Arunachal Pradesh while all the twelve species constitute new district records for Itanagar. Out of these the maximum numbers of species (8) are recorded under the subfamily Rutelinae namely *Anomala cantori* (Hope, 1839), *A. chloropus* Arrow, 1917, *A. dimidiata* (Hope, 1831), *A. variivestis* Arrow, 1917, *A. trochanterica* Arrow, 1917, *Mimela fulgidivittata* Blanchard, 1851, *Popillia macclellandi* Hope, 1845 and *P. nottrotti* Kraatz, 1892. The subfamily Cetoniinae includes two species *i.e. Agestrata orichalcea* (Linnaeus, 1769) and *Heterorrhina punctatissima* Westwood, 1842. The other two subfamilies (Dynastinae and Melolonthinae) are represented by single species *i.e. Alissonotum binodulum* (Fairmaire, 1891) and *Melolontha guttigera* Sharp, 1875 respectively. *A. cantori* and *A. dimidiata* are widely distributed throughout India and recorded only in the Oriental region. On the contrary, *Melolontha guttigera*, *Popillia macclellandi*, *P. nottrotti* and *Heterorrhina punctatissima* are mostly confined to the north-eastern states of India. *Agestrata orichalcea*, one of largest Cetoniine of India with its wide distributional range not only occurs in India but also being recorded from other geographical areas, mainly of the Oriental zoogeographical region. Systematic account of the newly recorded species from Arunachal Pradesh, along with their main diagnostic characteristics and geographic distributions are elaborated below.

Systematic Account

Family: Scarabaeidae Latreille, 1802

Subfamily: Melolonthinae Leach, 1819

Tribe: Melolonthini Leach, 1819

Sub tribe: Melolonthina Leach, 1819

***Melolontha guttigera* Sharp, 1875** (Figure 2A)

Specimens examined: Arunachal Pradesh**,** Itanagar, ZSI Complex, (1 ♂), Coll. P. T. Bhutia. (Reg. no. A/16568)

Diagnostic characters: Clypeus with short setae and side of eyes heavily setose. Pronotum densely punctured and the sides of pronotal midline with poorly deepened maculation, composed of yellowish white setae. Meso-metasternal process weakly developed, produced weakly beyond meso-coxae to the posterior margin of procoxae. Abdominal sternites without lateral maculation and abdominal surface with setae whitish brown. Protibia tridentate.

Known geographical distribution: India: Arunachal Pradesh (Itanagar), Sikkim and West Bengal. Elsewhere: Eastern Nepal.

Subfamily: Rutelinae MacLeay, 1819

Tribe Anomalini Streubel, 1839

Sub tribe Anomalina Streubel, 1839

***Anomala cantori* (Hope, 1839)** (Figure 2B)

Specimens examined: Arunachal Pradesh, Itanagar, Papumpare, Road to Yupia, 25.vi.2001 (1 ♀) Coll. P. T.

Bhutia. (Reg. no. IV/ 3342)

Diagnostic characters: Uniform dark coppery above and beneath, sometimes a little more greenish above. Broadly oval, convex, smooth above and slightly shining. Clypeus finely rugose and nearly semicircular with the margin scarcely refluxed and forehead densely punctured. Pronotum, scutellum and elytra densely punctured. Elytra without longitudinal lines of punctures, except a juxta sutural one.

Known geographical distribution: India: Assam, Arunachal Pradesh (Itanagar), Bihar, Chhattisgarh, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Sikkim, Tamil Nadu, Uttar Pradesh, Uttaranchal and West Bengal. Elsewhere: Myanmar.

***Anomala chloropus* Arrow, 1917** (Figure 2C)

Specimens examined: Arunachal Pradesh, Itanagar, Papumpare, ZSI Complex (light trap), 23.x.2002 (1 ♂), Coll. G. Lollen (Reg no. IV/3506).

Diagnostic characters: Apple-green with a narrow lateral border on pronotum. Lower surface and femora golden yellow with tibiae and tarsi deep metallic green. Shortly oval, convex and very shining, with the upper surface closely and minutely punctured. Clypeus broadly rounded, with forehead densely and rugosely punctured. Scutellum finely punctured and elytra a little more strongly, with indefinite longitudinal rows of rather larger punctures.

Known geographical distribution: India: Assam Arunachal Pradesh (Itanagar). Elsewhere: Myanmar.

***Anomala dimidiata* (Hope, 1831)** (Figure 2D)

Specimens examined: Arunachal Pradesh, Itanagar, ZSI Campus, 24.v.2002 (1 ♂) (Reg. no. IV/3174); ZSI Colony, (light trap), 18.v.2002 (1 ♀), Coll. P. T. Bhutia. (Reg. no. IV/2931)

Diagnostic characters: Grape green beetle with broad and oval body. Clypeus densely and frons less densely punctuate. Pronotum moderately closely punctuate and coarsely confluent at sides. Scutellum finely punctuate and elytra finely and closely punctuate, with slight traces of longitudinal lines. Pygidium moderately finely and transversely rugose.

Known geographical distribution: Arunachal Pradesh (Itanagar), Assam, Haryana, Madhya Pradesh, Sikkim, Uttar Pradesh, Uttarakhand and West Bengal. Elsewhere: Pakistan.

***Anomala variivestis* Arrow, 1917** (Figure 2E)

Specimens examined: Arunachal Pradesh, Itanagar, ZSI Colony, (light trap), 18.v.2002 (2 ♀), Coll. P. T. Bhutia. (Reg. no. IV/2956)

Diagnostic characters: Oval, convex, very smooth and shining. Testaceous yellow with clypeus forehead and tarsi red and a large patch on each side of the middle line of pronotum which partly fused. Extreme margins of elytra are black. Pronotum closely and finely punctured. Front tibia bi-dentate. Elytra deeply and closely punctuate striate.

Known geographical distribution: India: Arunachal Pradesh (Itanagar) and Manipur.

***Anomala trochanterica* Arrow, 1917** (Figure 2F)

Specimens examined: Arunachal Pradesh, Itanagar, ZSI Campus, 23.v.2002 (1 ♀), Coll. P. T. Bhutia (Reg. no. IV/3172).

Diagnostic characters: Black, smooth and shining with a very faint purplish luster upon elytra. Pronotum narrow, finely and closely punctured and strongly attenuated in front. Scutellum bears a few fine punctures and elytra bear faint longitudinal lines of very minute punctures. Pygidium finely and closely transversely strigose. No sternal process. Hind femur very thick and strongly arched, with the trochanter produced as a narrow process at its extremity. Tibia very short and thick and the tarsus broad and rather short.

Known geographical distribution: India: Arunachal Pradesh (Itanagar) and Sikkim.

***Mimela fulgidivittata* Blanchard, 1851** (Figure 2G)

Specimens examined: Arunachal Pradesh, Itanagar, ZSI Campus, (1 ♀), Coll. P. T. Bhutia (Reg. no. A/16569).

Diagnostic characters: Deep metallic green above and beneath, with the antennae ferruginous and with fiery-red markings on elytra. Pronotum finely and rather evenly punctured. Elytra finely but distinctly punctured all over except at the apices. Pygidium very finely and scantily punctured. Mesosternum bluntly prominent in the middle but not produced. Front tibia bi-dentate.

Known geographical distribution: India: Assam, Arunachal Pradesh (Itanagar), Haryana and Sikkim. Elsewhere: Bhutan.

Sub tribe Popilliina Ohaus, 1918

***Popillia macclellandi* Hope, 1845** (Figure 2H)

Specimens examined: Arunachal Pradesh, Itanagar, Papumpare, Road to Yupia, 25.vi.2001 (1 ♀) Coll. P. T. Bhutia. (Reg. no. IV/3344)

Diagnostic characters: Deep purplish crimson, metallic with elytra orange, suffused with a faint rosy metallic luster. Moderately elongate in shape with very stout legs. Very smooth and shining above and moderately clothed beneath with grey hairs. Pygidium bears two small patches of white hairs. The species resembles in form and sculpture to *P. cupricollis* Hope, but the punctures at the sides of pronotum are very minute and inconspicuous instead of being coarse and strong.

Known geographical distribution: India: Arunachal Pradesh (Itanagar) and Assam.

***Popillia nottrotti* Kraatz, 1892** (Figure 2I)

Specimens examined: Arunachal Pradesh, Itanagar, APFS/ZSI/ITA, 158P Sector, 25.vii.1996 (1 ♀), Coll. P. B. Thapa. (Reg. no. IV/ 2077)

Diagnostic characters: Coppery green above and beneath. Elytra orange with sides vaguely darkened. Body narrowly elongate and not very convex. Clypeus densely granular and broadly rounded in front. Pronotum finely punctured all over, sparingly in middle and very closely at sides. Elytra bear a smooth elevated sutural costae and a similar median dorsal one. Pygidium with two basal

patches of dense whitish hairs.

Known geographical distribution: India: Arunachal Pradesh (Itanagar), Sikkim and West Bengal.

Subfamily: Dynastinae MacLeay, 1819

Tribe Pentodontini Mulsant, 1842

***Alissonotum binodulum* (Fairmaire, 1891)** (Figure 2J)

Specimens examined: Arunachal Pradesh, Itanagar, ZSI Colony, (light trap) 17.v.2002 (1 ♀), Coll. P. T. Bhutia. (Reg. no. IV/2915)

Diagnostic characters: Black, reddish beneath, very smooth and shining, convex and rather broadly oval. Head rugose bidentate in front and provided with two median tubercles. Pronotum coarsely and rather closely punctured except in the middle, where there is a slight anterior impression and a minute elevation immediately

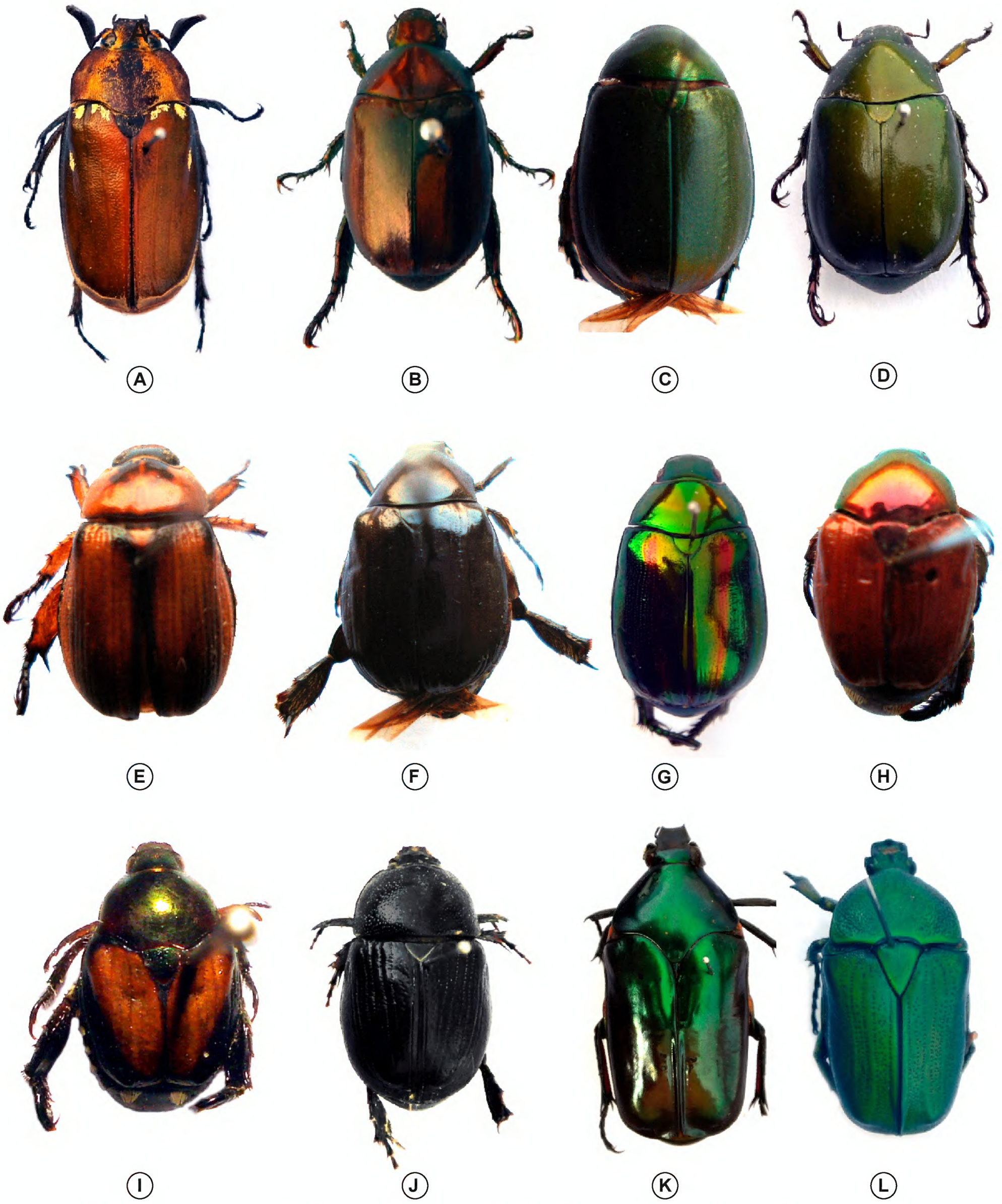

Figure 2. (A) *Melolontha guttigera* Sharp, (B) *Anomala cantori* (Hope), (C) *Anomala chloropus* Arrow, (D) *Anomala dimidiata* (Hope), (E) *Anomala variivestis* Arrow, (F) *Anomala trochanterica* Arrow, (G) *Mimela fulgidivittata* Blanchard, (H) *Popillia macclellandi* Hope, (I) *Popillia nottrotti* Kraatz, (J) *Alissonotum binodulum* (Fairmaire), (K) *Agestrata orichalcea* (Linnaeus), (L) *Heterorrhina punctatissima* Westwood.

in front of it. Scutellum smooth and elytra short and rather broad posteriorly and deeply striated with striae coarsely punctured.

Known geographical distribution: India: Arunachal Pradesh (Itanagar), Jammu and Kashmir and Punjab.

Subfamily: Cetoniinae Leach, 1815

Tribe Schizorhinini Burmeister, 1842

Sub tribe Lomapterina Burmeister, 1842

***Agestrata orichalcea* (Linnaeus, 1769)** (Figure 2K)

Specimens examined: Arunachal Pradesh, Itanagar, ZSI Campus, (1 ♂), Coll. P. T. Bhutia (Reg. no. A/16570)

Diagnostic characters: Metallic green with coxae, femora, mesosternal epimera, pygidium and sides of sternum and abdomen orange-red. Very long, narrow and rather flat. Clypeus narrow and rather straight-sided lightly punctured, but rather more strongly in front. Pronotum very finely coriaceous with minute punctures which are almost distinct at the sides. Elytra very long, smooth, scarcely perceptibly punctured except at the sides, and rather rugose at the extremity.

Known geographical distribution: India: Andaman and Nicobar Islands, Arunachal Pradesh (Itanagar), Maharashtra West Bengal and Tamil Nadu. Elsewhere: Bangladesh, Borneo, China, Singapore, Sri Lanka, Thailand, Malay Peninsula and Sumatra.

Tribe Goliathini Griffith and Pidgeon, 1832

Sub tribe Coryphocerina Burmeister, 1842

***Heterorrhina punctatissima* Westwood, 1842** (Figure 2L)

Specimens examined: Arunachal Pradesh, Itanagar, Papumpure, ZSI Campus, 17.x.2002 (1 ♀) Coll. P. B. Thapa. (Reg. no. IV/ 3488)

Diagnostic characters: Dorsal and ventral bright green colored but antennae and tarsi black. Elongate and rather flat. Head rugosely punctured, clypeus being quadrate, shorter than it is broad, with its front margin straight, reflexed and armed with a broad vertical tooth in the middle. Pronotum rather coarsely punctured and rather narrow in front. Scutellum feebly and elytra strongly and closely punctured. Pygidium evenly transversely strigose and metasternum coarsely punctured except in the middle.

Known geographical distribution: India: Arunachal Pradesh (Itanagar), Assam, Manipur and Sikkim.

Acknowledgments: The authors are thankful to Dr. K. Venkataraman, Director, Zoological Survey of India, Kolkata for providing necessary facilities and encouragement.

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Received: April 2012
Accepted: August 2012
Published online: September 2012
Editorial responsibility: Rodrigo M. Feitosa